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a chamber liner circumscribing the substrate support, the chamber liner having a passage fluidly isolated from the chamber volume at least partially formed in the chamber liner.

52. (AMENDED) Apparatus for lining a chamber volume of a semiconductor processing chamber, comprising:

13
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a liner having a plurality of apertures formed at least partially therein;

a passage at least partially formed in the liner and fluidly isolated from the chamber volume; and

a nozzle disposed in at least one of apertures.--.

REMARKS

This reply is intended as a full and complete response to the Office Action mailed on October 11, 2001. In view of both the amendments presented above and the following discussion, the Applicants believe that all claims are now in allowable form.

RESTRICTION

The Applicants confirm the election made by Todd Patterson on October 3, 2001, to prosecute the invention of Group II, claims 11-28. Claims 1-10 and 29-36 are cancelled without prejudice. The Applicants reserve the right to subsequently file divisional applications in order to prosecute the non-elected group.

Additionally, the Examiner has identified species and generic claims from the elected group. The Applicants confirm the election made by Todd Patterson on October 5, 2001, to prosecute generic claims 11-15 and Specie A, Claims 21-28.

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DRAWINGS

The drawings stand rejected for various reasons. In response, the Applicants have provided red-lined corrections to Figs. 1, 2B, 3 and 6.

Specifically, the Applicants have deleted reference numerals 126, 128, 130, 131, 148, 150, 151, 152, 188, 604 and 606 from Figs. 1 and 6. Reference numeral 226 has been replaced with 206 in Fig. 2B. Reference numeral 350 has been replaced with 350A in Fig. 3. Fig. 3 has also been amended to add the reference numeral 310 as described in the application at pages 7 and 8. Fig. 1 has been amended to distinguish liners 118 and 134 as separate elements. Additionally, the leader of reference numeral 122 in Fig. 1 has been extended to reference the o-ring as required by the Examiner.

Corrected formal drawings are enclosed in anticipation of the Examiner's approval of the submitted red-lined corrections Figs. 1, 2B, 3 and 6.

CLAIM REJECTIONS

A. 35 U.S.C. §102(e) Kao, et al.

Claims 11-12, 14-15, 21-22 and 24-25 stand rejected as being anticipated by United States Patent No. 6,176,198, issued January 23, 2001 to Kao, et al., (hereinafter referred to as "Kao"). In response, the Applicants have amended claim 11 and amended claim 26 to substantially incorporate the limitations of claim 25.

1. Claims 11-12, 14-15, 21-22 and 24

Independent claim 11 has been amended to recite limitations not taught or suggested by Kao. Claim 11, as amended, recites a chamber liner disposed in a chamber volume and circumscribing a substrate support, the chamber liner

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having a passage at least partially disposed in the chamber liner, the passage fluidly isolated from the chamber volume and having an inlet and an outlet adapted to flow a fluid through the passage. Kao does not teach or suggest a passage formed at least partially in the liner that is fluidly isolated from a chamber volume.

In contrast, Kao teaches a chamber body utilized in a deposition system. The chamber body includes a liner 24 having apertures 26 formed therethrough. An insert 30 is disposed proximate the liner 24 and forms a manifold 31 which is in fluid communication with the apertures 26. However, the apertures and the manifold of Kao are in fluid communication with the chamber volume. Thus, Kao does not teach or suggest a passage isolated from the chamber volume as claimed by the Applicants.

Thus, the Applicants submit that claim 11 and those claims depending therefrom are patentable over Kao. Accordingly, the Applicants respectfully request allowance of these claims.

2. Claim 25

Claim 26 has been amended, incorporating substantially all of the limitations of claim 25, to recite limitations not taught by Kao. Claim 26, as amended, recites a liner having a plurality of apertures formed therethrough, a lid disposed proximate the liner and defining a plenum at least partially therebetween, and a nozzle disposed in at least one of the apertures. Kao does not teach or suggest a nozzle disposed in at least one aperture of a chamber liner.

Thus, the Applicants submit that claim 26 is patentable over Kao. Accordingly, the Applicants respectfully request allowance of this claim.

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B. 35 U.S.C. §102() L i, et al.

Claims 11-12, 14-15, 21-22 and 24-25 stand rejected for being anticipated by Lei, et al., United States Patent No. 5,968,276, issued October 19, 1999 (to Lei, et al. hereinafter referred to as "Lei"). In response, the Applicants have amended claim 11 and re-written claim 26 to substantially incorporate the limitations of claim 25.

1. Claims 11-12, 14-15, 21-22 and 24

Independent claim 11 has been amended to recite limitations not taught or suggested by Lei. Claim 11, as amended, recites a chamber liner disposed in a chamber volume and circumscribing the substrate support, the chamber liner having a passage at least partially disposed in the chamber liner, the passage fluidly isolated from the chamber volume and having an inlet and an outlet adapted to flow a fluid through the passage. Lei does not teach or suggest a passage formed at least partially in the liner that is fluidly isolated from a chamber volume.

In contrast, Lei teaches a method and apparatus for thermally conditioning gas being delivered to a chemical vapor deposition chamber. The apparatus includes a gas distribution plate 24 having apertures formed therethrough. The gas distribution plate includes a coolant passage 94 formed around the circumference having an inlet port 96 and an outlet port 98. Although not shown, the gas distribution plate does not circumscribe a substrate support. Thus, the gas distribution plate of Lei does not teach or suggest a liner that circumscribes a substrate support as claimed by the Applicants.

Thus, the Applicants submit that claim 11 and those claims depending therefrom are patentable over Lei. Accordingly, the Applicants respectfully request allowance of these claims.

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2. Claim 25

Claim 26 has been amended, incorporating substantially all of the limitations of claim 25, to recite limitations not taught by Lei. Claim 26, as amended, recites a liner having a plurality of apertures formed therethrough, a lid disposed proximate the liner and defining a plenum at least partially therebetween, and a nozzle disposed in at least one of the apertures. Lei does not teach or suggest a nozzle disposed in at least one aperture of a chamber liner.

Thus, the Applicants submit that claim 26 is patentable over Lei. Accordingly, the Applicants respectfully request allowance of this claim.

C. 35 U.S.C. §102(e) Pu, et al.

Claims 11-12 and 14-15 stand rejected as being anticipated by United States Patent No. 6,273,022, issued August 14, 2001 to Pu, et al. (hereinafter referred to as "Pu"). In response, the Applicants have amended claim 11.

Independent claim 11 has been amended to recite limitations not taught by Pu. Claim 11, as amended, recites a chamber liner disposed in a chamber volume and circumscribing a substrate support, the chamber liner having a passage at least partially disposed in the chamber liner, the passage fluidly isolated from the chamber volume and having an inlet and an outlet adapted to flow a fluid through the passage. Pu does not teach or suggest a passage formed at least partially in the liner that is fluidly isolated from a chamber volume.

In contrast, Pu teaches a method and apparatus for inductively coupling electrical power in a processing system having a vacuum chamber. The vacuum chamber includes liners 26, 27. The liners 26, 27 include a passage for an exhaust port 24 and a passage (not shown) for process gas 22 to flow into the vacuum chamber. However, these ports and passages are in fluid communication with the chamber volume. Thus, the liners 26, 27 of Pu do not

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teach or suggest a passage isolated from the chamber volume as claimed by the Applicants.

Thus, the Applicants submit that claim 11 and those claims depending therefrom are patentable over Pu. Accordingly, the Applicants respectfully request allowance of these claims.

D. 35 U.S.C. §103 Claim 13

Claim 13 stands rejected as being unpatentable over Kao. The Applicants respectfully disagree.

As Kao was filed November 5, 1996 and issued January 23, 2001 after the Applicants' March 7, 2000 filing date, Kao is a 102(e) type reference. Kao was assigned to Applied Materials, Inc. by assignment recorded on March 11, 1999 (reel/frame 9656/0077).

As the inventors were employees of Applied Materials, Inc., at the time of the invention, the inventors were obligated to assign the rights to their invention to Applied Materials, Inc. The assignment of the Applicants' invention to Applied Materials, Inc. was recorded on June 2, 2000 (reel/frame 10884/0779). Thus, the Applicants' invention and Kao were commonly assigned at the time of the Applicants' invention. Since this application is filed after November 29, 1999, Kao does not preclude patentability under the provisions of 35 U.S.C. § 103(c), as amended by the American Inventors Protection Act of 1999. See MPEP 706.02(l)(1). Accordingly, the Applicants respectfully request the foregoing rejection to claim 13 be withdrawn.

E. 35 U.S.C. §103 Claims 23, 26 and 28

Claims 23, 26 and 28 stand rejected as being unpatentable over Kao, in further view of United States Patent No. 6,143,078, Issued November 7, 2000 to Ishikawa et al. (hereinafter referred to as "Ishikawa"). The Applicants respectfully disagree.

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As discussed above, Kao does not preclude patentability under the provisions of 35 U.S.C. §103(c). Moreover, as Ishikawa was filed November 13, 1998 and issued November 7, 2000 after the Applicants' March 7, 2000 filing date, Ishikawa is also a 102(e) type reference. Ishikawa was assigned to Applied Materials, Inc. by assignment recorded January 25, 1999 (reel/frame 9602/0765).

Thus, the Applicants' invention and Ishikawa were commonly assigned at the time of the Applicants' invention and therefore Ishikawa also does not preclude patentability under the provisions of 35 U.S.C. §103(c). Accordingly, the Applicants respectfully request the foregoing rejections to claims 23, 26 and 28 be withdrawn.

F. 35 U.S.C. §103 Claim 27

Claim 27 stands rejected as being unpatentable over Kao, in view of Ishikawa as applied to claims 23, 26 and 28 above, and in further view of United States Patent No. 5,824,158, issued November 7, 2000, to Takeuchi et al., (hereinafter referred to as "Takeuchi"). The Applicants respectfully disagree.

As discussed above, Kao and Ishikawa do not preclude patentability under the provisions of 35 U.S.C. §103(c). Additionally, Takeuchi alone does not teach or suggest the invention of claim 27. Therefore, the Applicants submit that claim 27 is patentable over Takeuchi. Accordingly, the Applicants respectfully request the foregoing rejection to claims 27 be withdrawn.

G. 35 U.S.C. §103 Claims 23, 26 and 28

Claims 23, 26 and 28 stand rejected as being unpatentable over Lei, in further view of Ishikawa. The Applicants respectfully disagree.

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As discussed above, Ishikawa does not preclude patentability under the provisions of 35 U.S.C. §103(c). As discussed above, Lei does not teach or suggest the limitations of claims 11 or 26, from which claims 23 and 28 depend.

Therefore, the Applicants submit that claims 23, 26 and 28 are patentable over Lei. Accordingly, the Applicants respectfully request the foregoing rejection to claims 23, 26 and 28 be withdrawn.

H. 35 U.S.C. §103 Claim 27

Claim 27 stands rejected as being unpatentable over Lei, in view of Ishikawa as applied above, and in further view of Takeuchi. The Applicants respectfully disagree.

As discussed above, Ishikawa does not preclude patentability under the provisions of 35 U.S.C. §103(c). As additionally discussed above, Lei and Takeuchi alone do not teach or suggest the limitations of claims 26 from which claim 27 depends. Furthermore, Lei and Takeuchi combined do not teach or suggest a passage formed at least partially in the liner that is fluidly isolated from a chamber volume as recited by claim 27.

Therefore, the Applicants submit that claim 27 is patentable over Lei and Takeuchi. Accordingly, the Applicants respectfully request the foregoing rejection to claim 27 be withdrawn.

CONCLUSION

Thus, the Applicants submit that all claims now pending are in condition for allowance. Any necessary petition for extension of time for reply is hereby made. Associated fees are provided by deposit account transaction on a separate fee transmittal form. Accordingly, both reconsideration of this application and swift passage to issue are earnestly solicited.

If the Examiner believes that any unresolved issues still exist in any of these claims that require an adverse action therefor, it is requested that the

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Examiner telephone Keith Taboada at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

Feb 7, 2002



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Allyson M. DeVesty
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Signature

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APPENDIX I
MARK-UP OF AMENDED CLAIMS

1. (CANCELLED) A thermally controlled apparatus for lining a semiconductor processing chamber comprising:
 - a base;
 - an inner wall connected to the base; and
 - a passage disposed in the base, the inner wall or the base and the inner wall, the passage having an inlet and outlet.
2. (CANCELLED) The apparatus of claim 1 further comprising an outer wall connected to the base.
3. (CANCELLED) The apparatus of claim 2 wherein the outer wall further comprises a pumping port.
4. (CANCELLED) The apparatus of claim 1 wherein the inner wall further comprises a magnet disposed in the inner wall.
5. (CANCELLED) The apparatus of claim 1 wherein the base is comprised of a material selected from the group of aluminum, ceramic and stainless steel.
6. (CANCELLED) The apparatus of claim 1 further comprising:
 - a first and second boss projecting from the base, the first boss comprising a hole in fluid communication with the passage at the inlet, and the second boss comprising a hole in fluid communication with the passage at the outlet.
7. (CANCELLED) A thermally controlled apparatus for lining a semiconductor processing chamber comprising:
 - a center member;
 - a flange circumscribing the center member;
 - a cylindrical wall projecting from the center member inside of the flange;and
 - a passage disposed in the center member having an inlet and an outlet.
8. (CANCELLED) The apparatus of claim 7 further comprising:
 - a lid disposed opposite the cylindrical wall, the lid and the wall defining a plenum at least partially therebetween.
9. (CANCELLED) The apparatus of claim 8 wherein the center member further comprises:
 - a plurality of nozzles disposed in the center member providing fluid access to the plenum.

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10. (CANCELLED) The apparatus of claim 8 further comprising:
a gas feedthrough fluidly coupled to the plenum through a hole disposed in the lid.
11. (AMENDED) A semiconductor processing chamber comprising:
a wall, a bottom and a lid assembly defining a chamber volume;
a substrate support disposed within the chamber volume; and
a chamber liner disposed in the chamber volume and circumscribing the substrate support, the chamber liner having a passage at least partially disposed in the chamber liner [therein], the passage fluidly isolated from the chamber volume and having an inlet and outlet adapted to flow a fluid through the passage.
25. (CANCELLED) Apparatus for lining a semiconductor processing chamber comprising:
a liner having a plurality of apertures formed at least partially therein; and
a lid having an inlet, the lid disposed proximate the liner and defining a plenum at least partially therebetween.
26. (AMENDED) [The apparatus of claim 25 further comprising:] Apparatus for lining a semiconductor processing chamber comprising:
a liner having a plurality of apertures formed at least partially therein;
a lid having an inlet, the lid disposed proximate the liner and defining a plenum at least partially therebetween; and
a nozzle disposed in [each of the plurality] at least one of apertures.
29. (CANCELLED) A nozzle for providing fluid entry to a processing chamber comprising:
a mounting portion adapted to be couple to the processing chamber; and
a gas delivery portion, the mounting portion and the gas delivery having one or more passages extending through.
30. (CANCELLED) The nozzle of claim 29, wherein one of the one or more passages comprises:
a central passage extending at least partially through the mounting portion; and
one or more secondary passages disposed in the gas delivery portion fluidly coupling the central passage to the processing chamber.
31. (CANCELLED) The nozzle of claim 30, wherein the gas delivery portion further comprises:
an end proximate the mounting portion, wherein an outlet of the one or more secondary passages are disposed at least about 0.25 inches from the end.

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32. (CANCELLED) The nozzle of claim 30, wherein the secondary passages are directed to deliver gas at an angle relative an end proximate the mounting portion.

33. (CANCELLED) The nozzle of claim 32, wherein the angle is about 15 to about 35 degrees.

34. (CANCELLED) The nozzle of claim 29, wherein one of the one or more secondary passages comprises:

a central passage extending through the mounting portion and the gas delivery portion; and

one or more secondary passages fluidly coupling the central passage to the processing chamber.

35. (CANCELLED) The nozzle of claim 29, wherein the gas delivery portion has a curved distal end.

36. (CANCELLED) The nozzle of claim 29, wherein the gas delivery portion and the mounting portion have an oblique orientation.

37. (NEW) The apparatus of claim 25, wherein the second side of the liner is textured.

38. (NEW) Apparatus for lining a process volume defined by sidewalls of a semiconductor processing chamber comprising:

a liner adapted to be removably disposed in the process volume; and

a passage at least partially formed in the liner isolated from the process volume and adapted to flow a heat transfer medium therethrough.

39. (NEW) The apparatus of claim 38, wherein the liner further comprises:
a cylindrical wall.

40. (NEW) The apparatus of claim 39, wherein the passage is formed at least partially in the cylindrical wall.

41. (NEW) The apparatus of claim 39, wherein the liner further comprises:
a bottom coupled to the cylindrical wall.

42. (NEW) The apparatus of claim 41, wherein the passage is formed at least partially in the bottom.

43. (NEW) The apparatus of claim 39, wherein the cylindrical wall is configured to line the sidewalls to the chamber.

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44. (NEW) The apparatus of claim 39, wherein the cylindrical wall is configured to line a substrate support disposed in the process volume of the chamber.
45. (NEW) The apparatus of claim 38, wherein the liner further comprises:
an outer cylindrical wall;
an inner cylindrical wall; and
a bottom coupled between the outer cylindrical wall and the inner cylindrical wall.
46. (NEW) The apparatus of claim 45, wherein the passage is formed in at least partially in at least one of the inner cylindrical wall, outer cylindrical wall and the bottom.
47. (NEW) A semiconductor processing chamber comprising:
a wall, a bottom and a lid assembly defining a chamber volume;
a substrate support disposed within the chamber volume; and,
a chamber liner having at least a first portion disposed proximate the wall, the chamber liner having a passage fluidly isolated from the chamber volume at least partially formed in the chamber liner.
48. (NEW) The chamber of claim 47, wherein the chamber liner further comprises:
a second portion disposed proximate the lid assembly.
49. (NEW) The chamber of claim 48, wherein the second portion of the chamber liner further comprises:
a plurality of apertures formed therethrough.
50. (NEW) The chamber of claim 49 further comprising a plate disposed on the chamber liner and forming a plenum therewith, the plenum in fluid communication with the chamber volume through the apertures.
51. (NEW) A semiconductor processing chamber comprising:
a wall, a bottom and a lid assembly defining a chamber volume;
a substrate support disposed within the chamber volume; and,
a chamber liner circumscribing the substrate support, the chamber liner having a passage fluidly isolated from the chamber volume at least partially formed in the chamber liner.

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52. (AMENDED) Apparatus for lining a chamber volume of a semiconductor processing chamber, comprising:
a liner having a plurality of apertures formed at least partially therein;
a passage at least partially formed in the liner and fluidly isolated from the chamber volume; and
a nozzle disposed in at least one of apertures.

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APPENDIX II
CLAIMS NOW PENDING

11. (AMENDED) A semiconductor processing chamber comprising:
a wall, a bottom and a lid assembly defining a chamber volume;
a substrate support disposed within the chamber volume; and,
a chamber liner disposed in the chamber volume, the chamber liner having a passage at least partially disposed therein, the passage having an inlet and outlet adapted to flow a fluid through the passage.
12. The chamber of claim 11 wherein the chamber liner further comprises at least one of:
a first liner disposed proximate the lid assembly; or
a second liner disposed about the substrate support.
13. The chamber of claim 11 wherein the chamber liner is retained in the chamber by a clamp affixed to the chamber.
14. The chamber of claim 11 wherein the chamber liner is comprised of a thermally conductive material.
15. The chamber of claim 11 wherein the chamber liner is comprised of a material selected from the group of aluminum, ceramic and stainless steel.
16. The apparatus of claim 12 wherein the second liner further comprises:
a base having the passage disposed within; and
an inner wall connected to the base.
17. The apparatus of claim 16 wherein the second liner further comprises:
an outer wall connected to the base.
18. The apparatus of claim 16 wherein the second liner further comprises:
a first and second boss projecting from the base, the first boss comprising a hole in fluid communication with the passage at the inlet, and the second boss comprising a hole in fluid communication with the passage at the outlet.
19. The apparatus of claim 16 wherein inner wall further comprises a magnet disposed in the inner wall.
20. The apparatus of claim 17 wherein the outer wall further comprises a pumping port.

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21. The apparatus of claim 12 wherein the first liner further comprises:
a center member having the passage disposed within;
a flange circumscribing the center member; and,
a cylindrical wall projecting from the center member inside of the flange.
22. The apparatus of claim 21 further comprising:
a lid disposed opposite the cylindrical wall, the lid and the wall defining a plenum at least partially therebetween.
23. The apparatus of claim 22 wherein the center member further comprises:
a plurality of nozzles disposed in the center member providing fluid access to the plenum.
24. The apparatus of claim 22 further comprising:
a gas feedthrough fluidly coupled to the plenum through a hole disposed in the lid.
25. Apparatus for lining a semiconductor processing chamber comprising:
a liner having a plurality of apertures formed at least partially therein; and
a lid having an inlet, the lid disposed proximate the liner and defining a plenum at least partially therebetween.
26. (AMENDED) Apparatus for lining a semiconductor processing chamber comprising:
a liner having a plurality of apertures formed at least partially therein;
a lid having an inlet, the lid disposed proximate the liner and defining a plenum at least partially therebetween; and
a nozzle disposed in at least one of apertures.
27. The apparatus of claim 26, wherein the nozzle is comprised of quartz, silicon carbide, silicon, aluminum nitride, aluminum oxide or combinations thereof.
28. The apparatus of claim 26, wherein the liner further comprises:
a channel having an inlet and an outlet disposed in the liner.
37. (NEW) The apparatus of claim 25, wherein the second side of the liner is textured.
38. (NEW) Apparatus for lining a process volume defined by sidewalls of a semiconductor processing chamber comprising:
a liner adapted to be removably disposed in the process volume; and
a passage at least partially formed in the liner isolated from the process volume and adapted to flow a heat transfer medium therethrough.

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39. (NEW) The apparatus of claim 38, wherein the liner further comprises:
a cylindrical wall.
40. (NEW) The apparatus of claim 39, wherein the passage is formed at least partially in the cylindrical wall.
41. (NEW) The apparatus of claim 39, wherein the liner further comprises:
a bottom coupled to the cylindrical wall.
42. (NEW) The apparatus of claim 41, wherein the passage is formed at least partially in the bottom.
43. (NEW) The apparatus of claim 39, wherein the cylindrical wall is configured to line the sidewalls to the chamber.
44. (NEW) The apparatus of claim 39, wherein the cylindrical wall is configured to line a substrate support disposed in the process volume of the chamber.
45. (NEW) The apparatus of claim 38, wherein the liner further comprises:
an outer cylindrical wall;
an inner cylindrical wall; and
a bottom coupled between the outer cylindrical wall and the inner cylindrical wall.
46. (NEW) The apparatus of claim 45, wherein the passage is formed in at least partially in at least one of the inner cylindrical wall, outer cylindrical wall and the bottom.
47. (NEW) A semiconductor processing chamber comprising:
a wall, a bottom and a lid assembly defining a chamber volume;
a substrate support disposed within the chamber volume; and,
a chamber liner having at least a first portion disposed proximate the wall, the chamber liner having a passage fluidly isolated from the chamber volume at least partially formed in the chamber liner.
48. (NEW) The chamber of claim 47, wherein the chamber liner further comprises:
a second portion disposed proximate the lid assembly.
49. (NEW) The chamber of claim 48, wherein the second portion of the chamber liner further comprises:
a plurality of apertures formed therethrough.

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50. (NEW) The chamber of claim 49 further comprising a plate disposed on the chamber liner and forming a plenum therewith, the plenum in fluid communication with the chamber volume through the apertures.

51. (NEW) A semiconductor processing chamber comprising:
a wall, a bottom and a lid assembly defining a chamber volume;
a substrate support disposed within the chamber volume; and,
a chamber liner circumscribing the substrate support, the chamber liner having a passage fluidly isolated from the chamber volume at least partially formed in the chamber liner.

52. (AMENDED) Apparatus for lining a chamber volume of a semiconductor processing chamber, comprising:
a liner having a plurality of apertures formed at least partially therein;
a passage at least partially formed in the liner and fluidly isolated from the chamber volume; and
a nozzle disposed in at least one of apertures.

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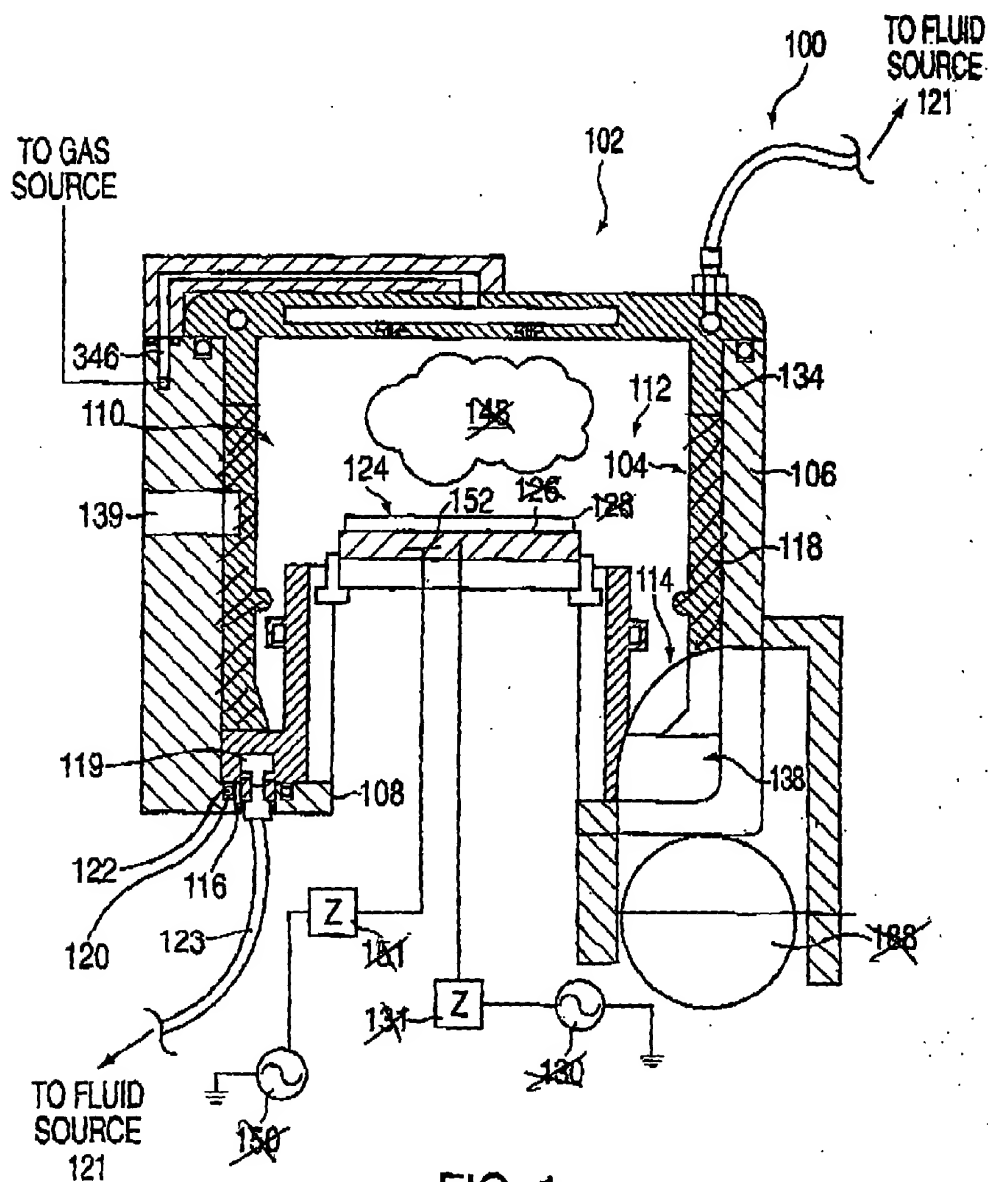


FIG. 1

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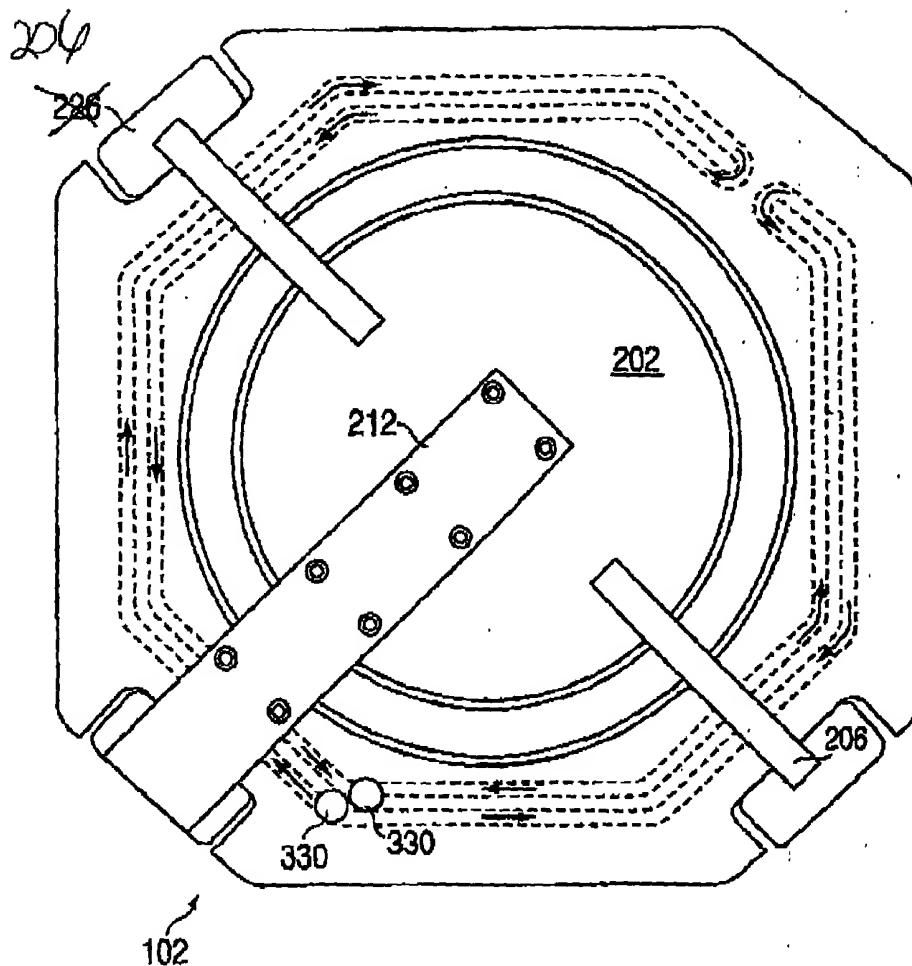


FIG. 2B

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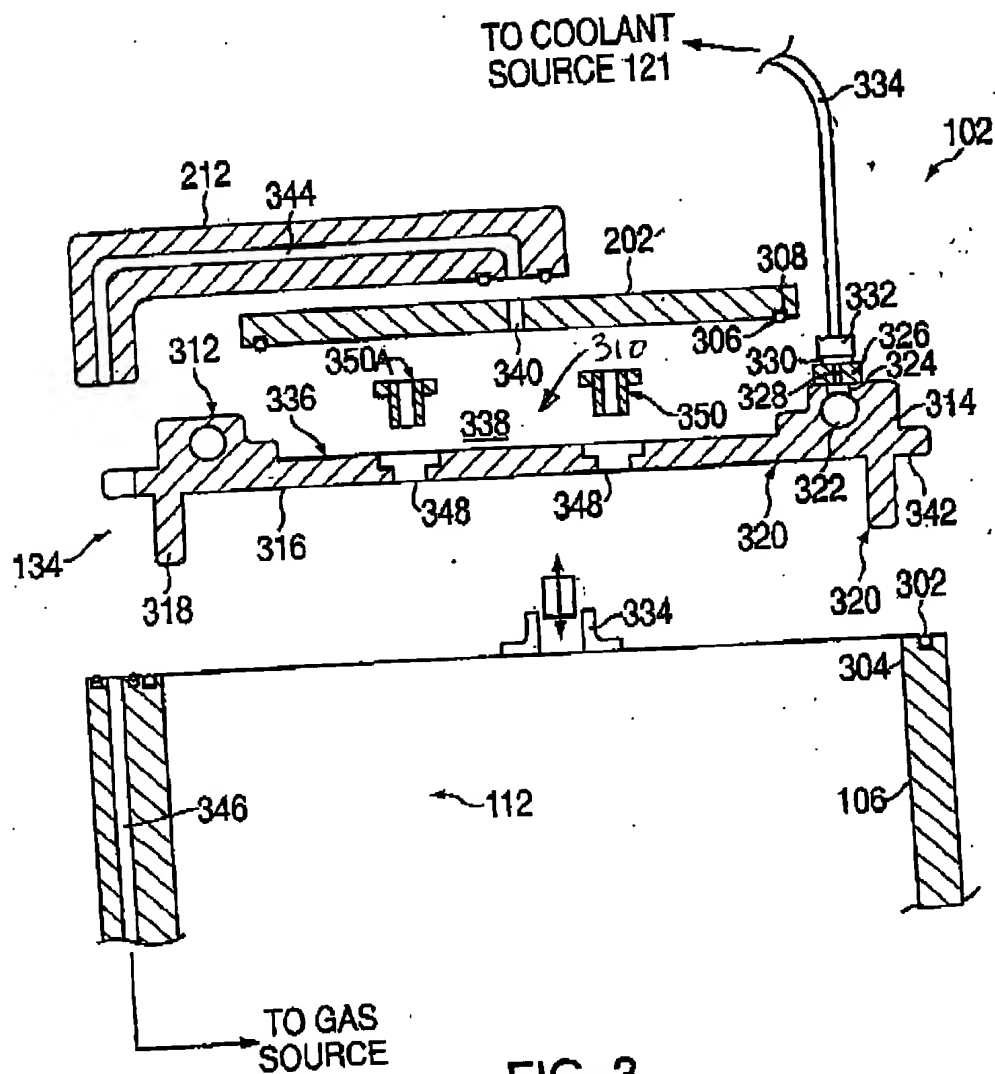
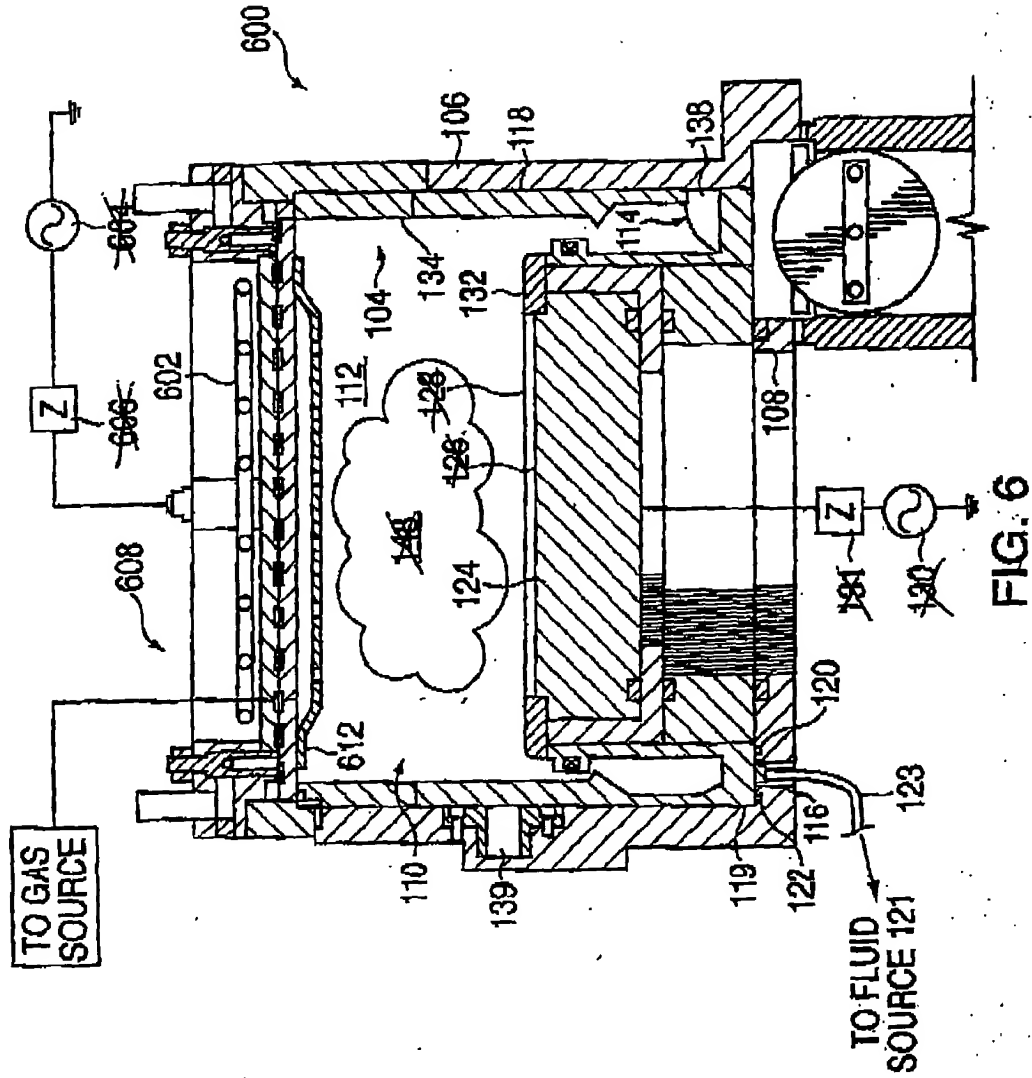


FIG. 3

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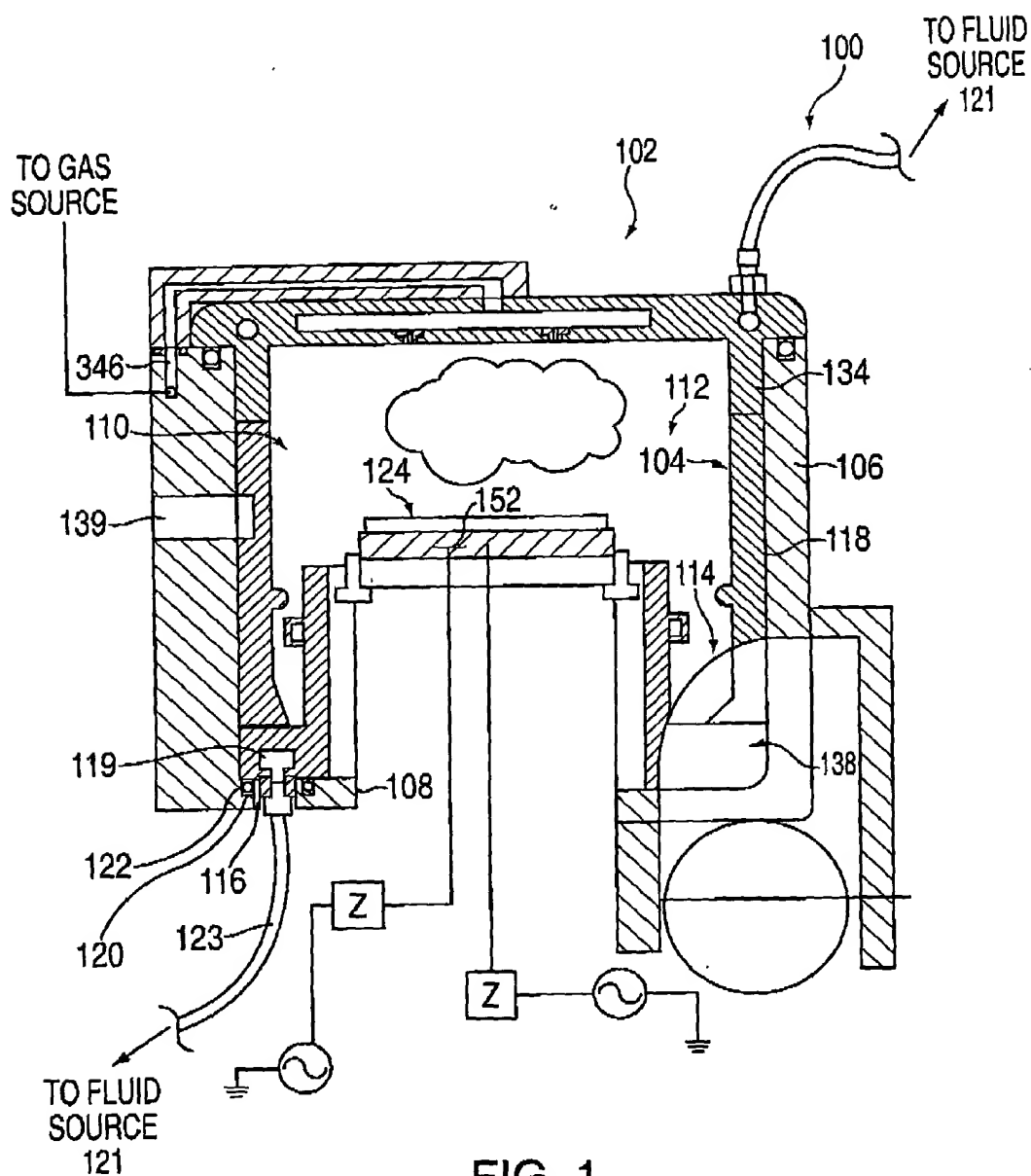


FIG. 1

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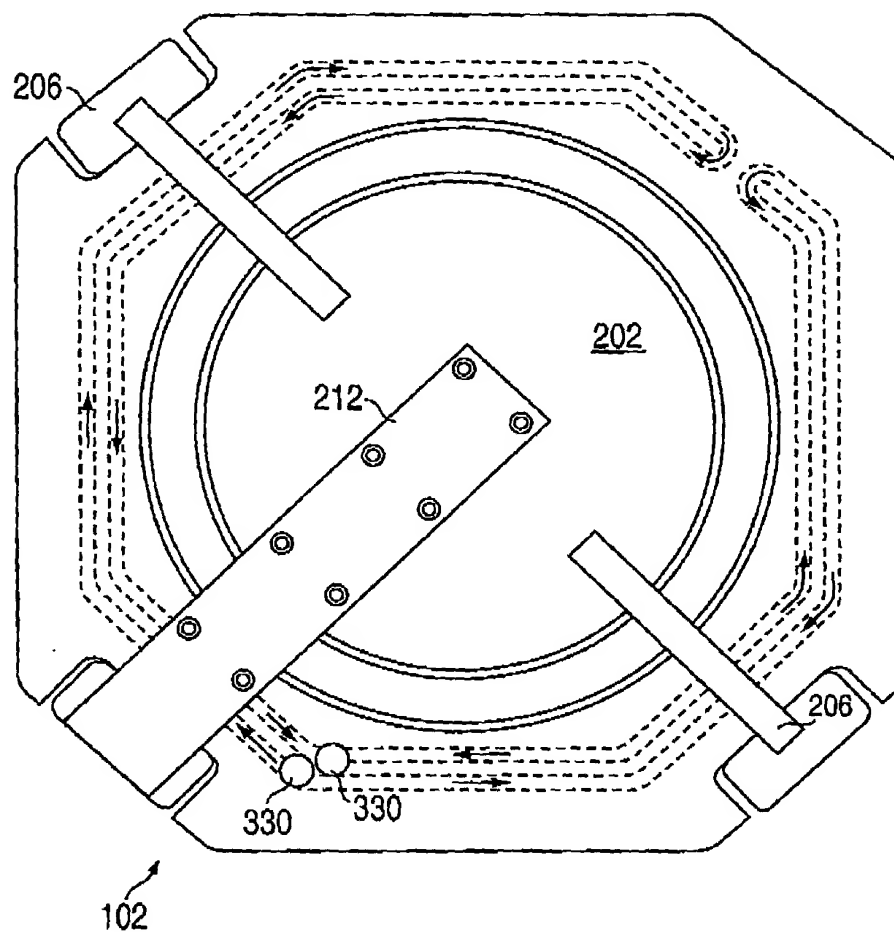


FIG. 2B

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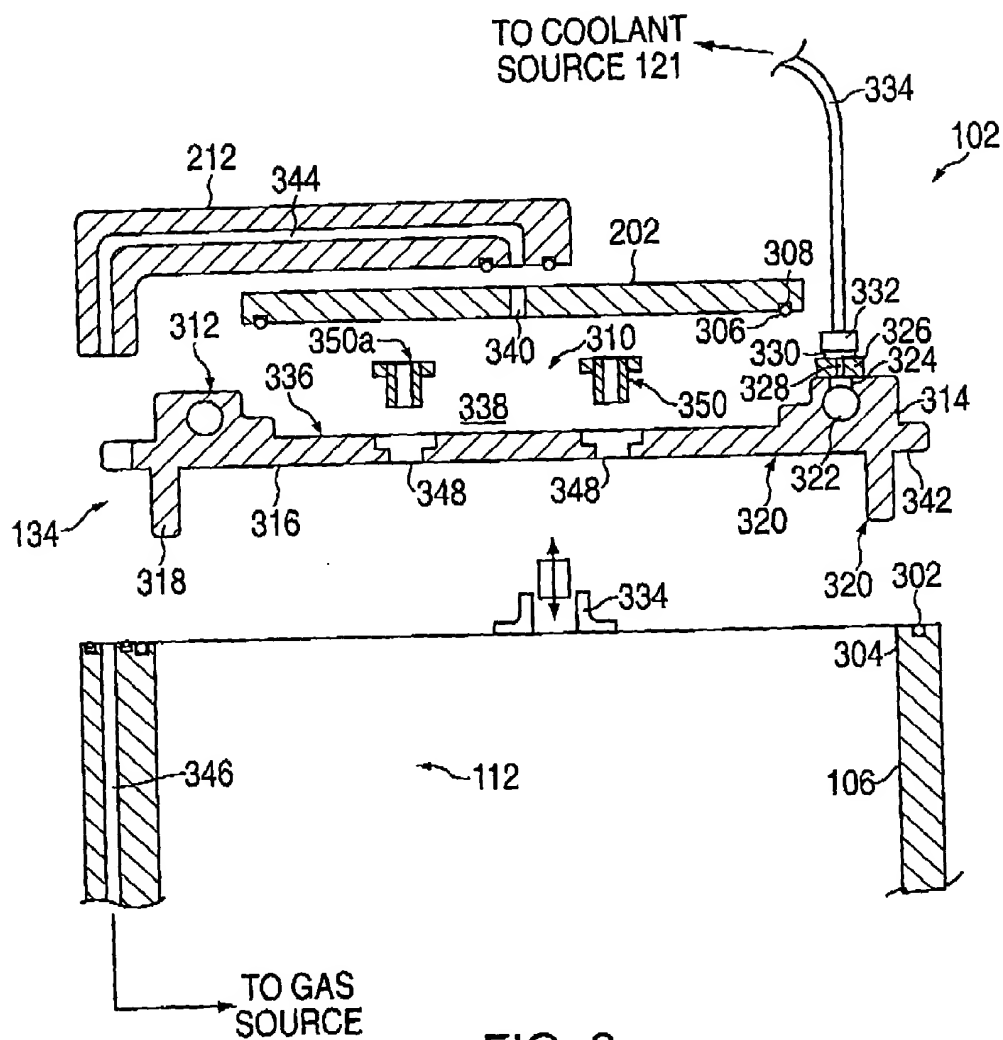


FIG. 3

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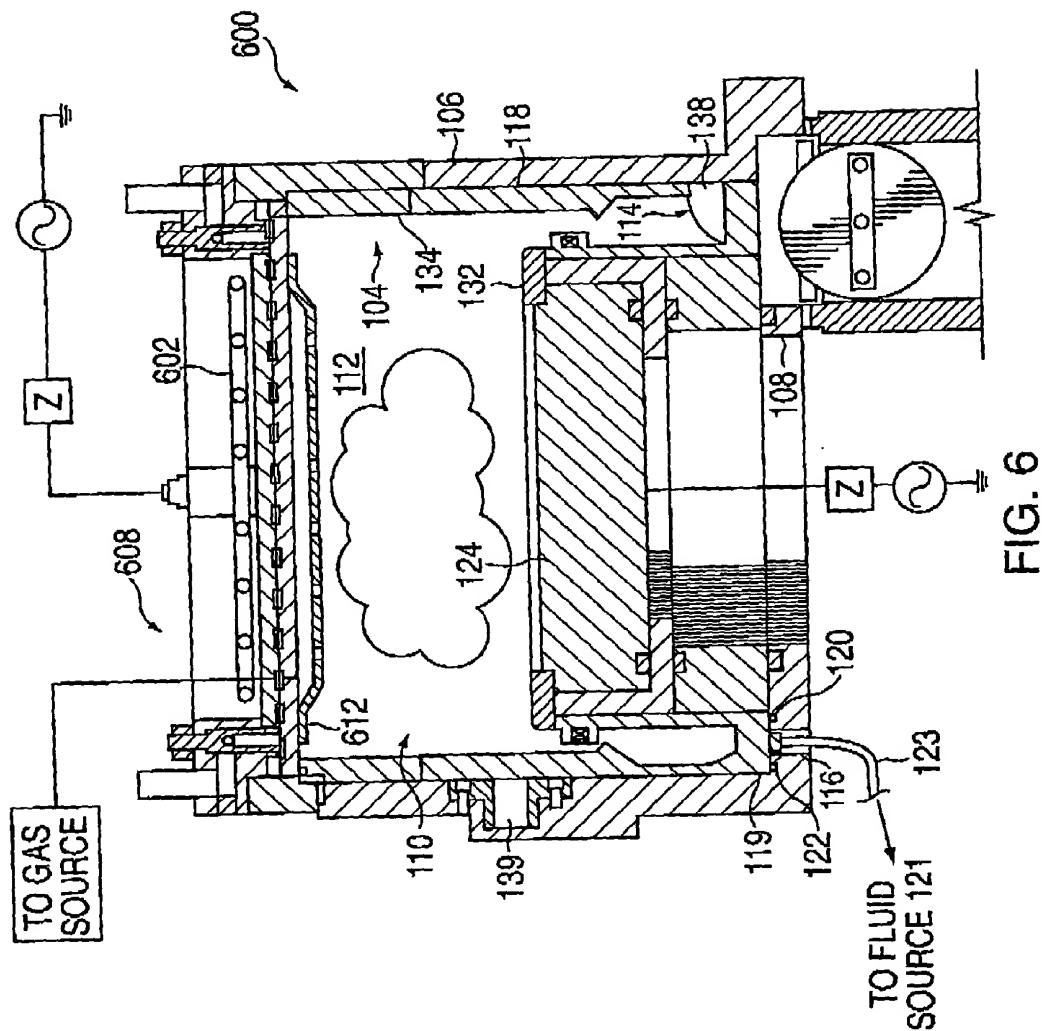


FIG. 6